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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/471,497	12/23/1999	ISAO MIHARA	0039-7495-2S	7481

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EXAMINER

BHATNAGAR, ANAND P

ART UNIT PAPER NUMBER

2623

DATE MAILED: 02/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/471,497	MIHARA ET AL.	
	Examiner	Art Unit	
	Anand Bhatnagar	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 9, 27, and 29-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 9, 27, 29-37, 39, 41 and 43 is/are rejected.
- 7) ☒ Claim(s) 38, 40, and 42 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 December 1999 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>09/22/04</u> . | 6) <input type="checkbox"/> Other: _____ |

Response to Arguments

1. Applicant's amendment filed on 11/19/04 has been entered and made of record.
2. Applicant has amended claims 1, 9, and 27. Applicant has added 6 new claims (#38-#43). Claims 2, 3, 5, 6, 8, 10-15, 17-22, 24-26, and 28 have been canceled. Claims 4, 7, 16, and 23 were previously withdrawn. Claims 29-37 were previously presented. Currently, claims 1, 9, 27, and 29-43 are pending. Examiner refers to the rejection below.

DETAILED ACTION

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

A.) Claims 1, 9, 27, 29, 30, 32, 33, 35, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al. ("**A robust method for registration and segmentation of multiple range images**," Masuda, T.; Yokoya, N.; CAD-Based Vision Workshop, 1994., IEEE, Proceedings of the 1994 Second , 8-11 Feb. 1994 Pages:106 - 113) and Hiura et al. ("**Real-time object tracking by rotating range sensor**," Hiura, S.; Yamaguchi, A.; Sato, K.; Inokuchi, S.; Pattern

Recognition, 1996., IEEE, Proceedings of the 13th International Conference on
, Volume: 1 , 25-29 Aug. 1996 Pages:825 - 829 vol.1).

Regarding claims 1, 9, and 27: Masuda et al. discloses an image
recognition method for recognizing an object comprising:

capturing the object to generate a range image having three-dimensional
information representing a three-dimensional shape of the object (Masuda et al.;
abstract, 1st paragraph of introduction, and section 2, wherein two range images
of an object are used to determine motion);

generating a three-dimensional deformed image by three-dimensionally
deforming the range image (Masuda et al.; page 107 first two paragraphs of
section 3, wherein the estimated motion parameters are applied to the first range
image to transform the 3D range image. This transformation is read as deforming
the image); and

recognizing three-dimensional motion of an the object in the range image
by comparing the deformed image with a newly captured range image obtained
by capturing the object currently (Masuda et al.; page 107 first two paragraphs of
section 3, wherein the transformed/deformed image is compared to the second
range image to determine the residuals in order to evaluate for the estimated
motion for each trial).

Masuda et al. discloses to determine the motion of an object(s) using two
range images obtained of the object. Masuda et al. further teaches to transform
the first range image by applying estimated motion parameters to it. Masuda et
al. does not teach to currently obtain an image of the object. Hiura et al. teaches

to perform "real time" capturing and processing on range images to determine the motion of an object (Hiura et al.; abstract, performing it in real time is read as capturing the range images "currently"). It would have been obvious to one skilled in the art to combine the teaching of Hiura et al. to the system of Masuda et al. because they are analogous in detecting the motion of an object in range images. One in the art would have been motivated to incorporate the teaching, "real time" imaging and processing of range images, of Hiura et al. in order to make the system more efficient and to minimize the amount of memory needed in the system if it is done in real time.

Regarding claim 27 for limitation of the computer-usable medium having a computer readable program: Examiner takes Official Notice.

Regarding claims 29, 32, and 35: An image recognition method wherein the deformed image is a rotated deformed image (Masuda et al.; section 2 wherein the 3D rotation matrix is used and applied to the images).

Regarding claim 30, 33, and 36: An image recognition method wherein the deformed image is moved in parallel (Masuda et al.; section 2 wherein a 3D translational vector, i.e. translational motion, is used and applied. This translational motion is read as parallel motion).

B.) Claims 31, 34, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al. ("**A robust method for registration and segmentation of multiple range images,**" Masuda, T.; Yokoya, N.; CAD-Based Vision Workshop, 1994., IEEE, Proceedings of the 1994 Second , 8-11 Feb. 1994

Pages:106 – 113), as modified by Hiura et al. ("**Real-time object tracking by rotating range sensor,**" *Hiura, S.; Yamaguchi, A.; Sato, K.; Inokuchi, S.*; Pattern Recognition, 1996., IEEE, Proceedings of the 13th International Conference on , Volume: 1 , 25-29 Aug. 1996 Pages:825 - 829 vol.1), and further in view of Szeliski et al. (U.S. patent 6,157,747).

Regarding claim 31, 34, and 37: An image recognition method wherein the deformed image is contracted by rotation. Masuda et al., as modified by Hiura et al., discloses a system wherein a motion of a 3D object is determined from range images. Masuda et al. further teaches to transform an range image based on estimated motion (rotational and/or translational) parameters. Masuda et al., as modified by Hiura et al., does not teach to contract the image by rotation. Szeliski et al. teaches to scale (expand/contract) a 3D image based on the rotational motion (Szeliski et al.; col. 23 lines 50-60). It would have been obvious to one skilled in the art to combine the teaching of Szeliski et al. to that of Masuda et al., as modified by Hiura et al.; because they are analogous in processing 3D images. One in the art would have been motivated to incorporate the teaching of Szeliski et al., to the system of Masuda et al., as modified by Hiura et al., in order to correct for mis-registration errors (Szeliski et al.; col. 3 lines 35-36).

C.) Claims 39, 41, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al. ("**A robust method for registration and segmentation of multiple range images,**" *Masuda, T.; Yokoya, N.*; CAD-Based Vision Workshop, 1994., IEEE, Proceedings of the 1994 Second , 8-11 Feb. 1994

Pages:106 – 113), as modified by Hiura et al. ("**Real-time object tracking by rotating range sensor**," *Hiura, S.; Yamaguchi, A.; Sato, K.; Inokuchi, S.*; Pattern Recognition, 1996., IEEE, Proceedings of the 13th International Conference on , Volume: 1 , 25-29 Aug. 1996 Pages:825 - 829 vol.1), and further in view of Sato et al. ("**Recovering shape and reflectance properties from a sequence of range and color images**," *Sato, Y.; Ikeuchi, K.*; Multisensor Fusion and Integration for Intelligent Systems, 1996. IEEE/SICE/RSJ International Conference on , 8-11 Dec. 1996 Pages:493 – 500).

Regarding claim 39, 41, and 43: An image recognition method wherein the capturing includes capturing the object to generate the range image based on a spatial intensity distribution of light reflected by the object. Masuda et al. discloses a system to determine the motion of an object in range images. Masuda et al. does not teach to generate range images based on the spatial intensity distribution of light reflected from the object. Sato et al. teaches to obtain 3D images based on the reflectance of light from the object (Sato et al.; abstract and sections 2 and 3, the reflectance of light from the object is read as the spatial intensity distribution of light). It would have been obvious to one skilled in the art to combine the teaching of Sato et al. to that of Masuda et al. because they are analogous in the field of range images. One in the art would have been motivated to incorporate the teaching of Sato et al. into the system of Masuda et al. in order to obtain realistic 3D images of an object (Sato et al.; section 1 page 493).

Regarding claim 43 for limitation of the computer-readable program:
Examiner takes Official Notice.

Allowable Subject Matter

4. Claims 38, 40, and 42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

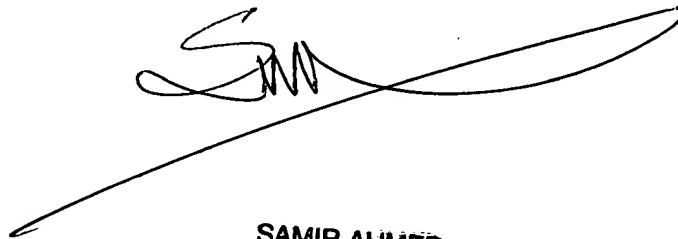
5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Contact Information

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anand Bhatnagar whose telephone number is (703) 306-5914, whose supervisor is Amelia Au whose number is 703-308-6604, group fax is 703-872-9306, and Tech center 2600 customer service office number is 703-306-0377.

A handwritten signature in black ink, appearing to read 'SAMIR', with a long, sweeping horizontal line extending to the right.

**SAMIR AHMED
PRIMARY EXAMINER**

Handwritten initials 'AB' in black ink.

Anand Bhatnagar

Art Unit 2623

February 15, 2005